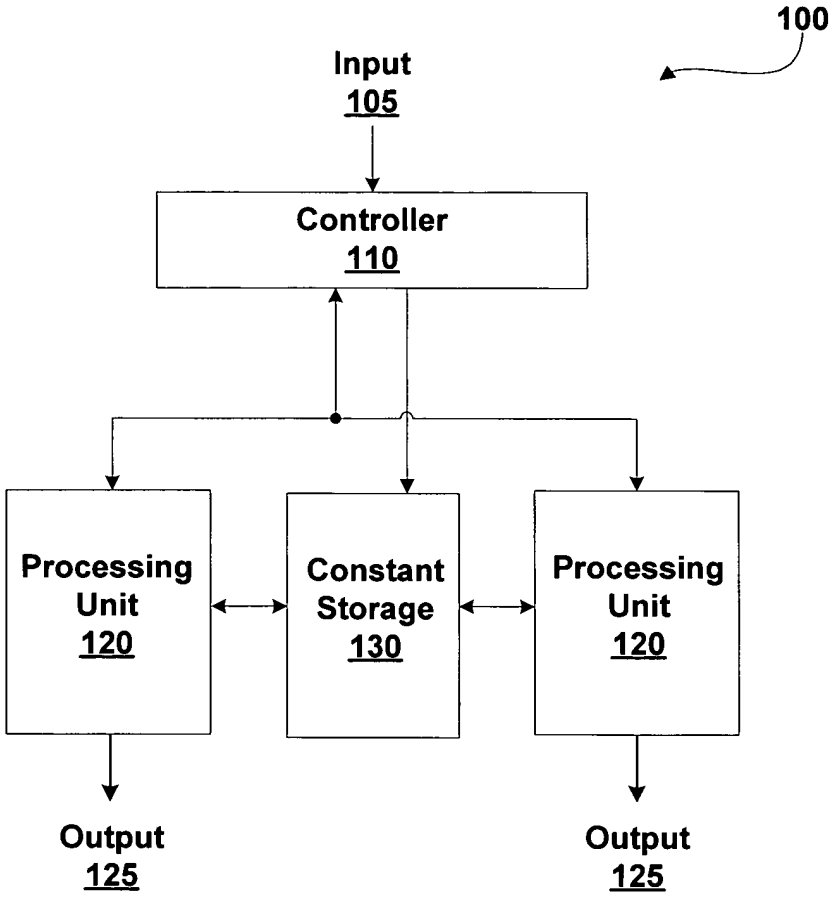

PRIOR ART

FIG. 1

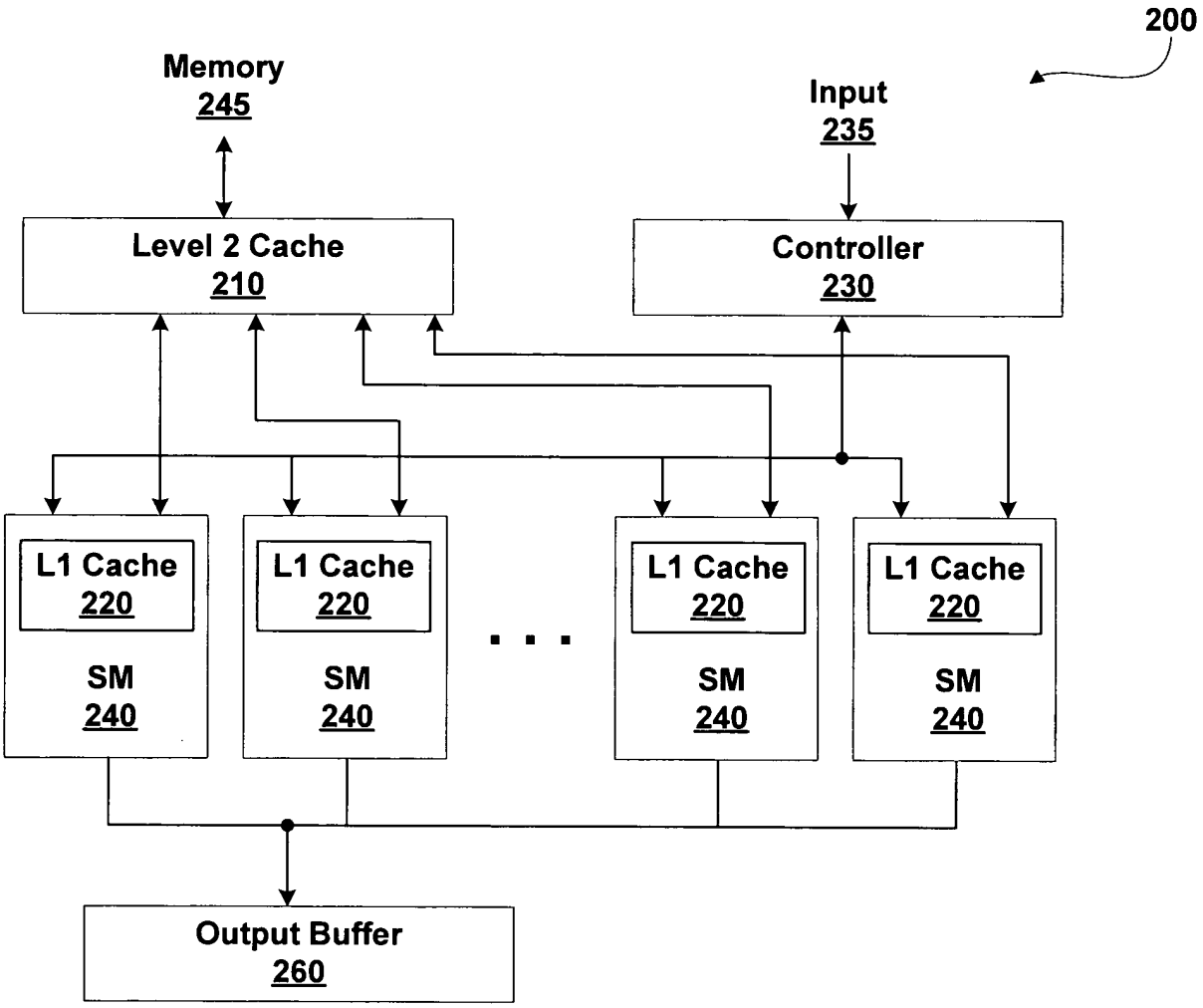
200
Memory
245
Input
235
Level 2 Cache
210
Controller
230
L1 Cache
220
SM
240
L1 Cache
220
SM
240
L1 Cache
220
SM
240
L1 Cache
220
SM
240
Output Buffer
260

FIG. 2

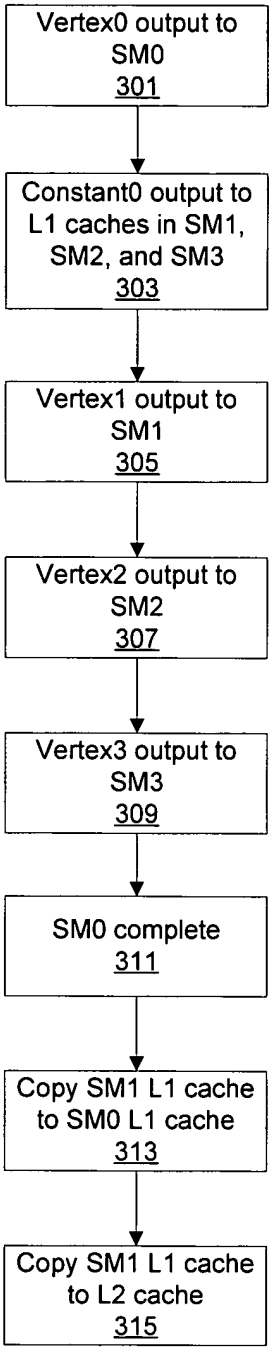
Vertex0 output to SM0
301
Constant0 output to L1 caches in SM1, SM2, and SM3
303
Vertex1 output to SM1
305
Vertex2 output to SM2
307
Vertex3 output to SM3
309
SM0 complete
311
Copy SM1 L1 cache to SM0 L1 cache
313
Copy SM1 L1 cache to L2 cache
315

FIG. 3A

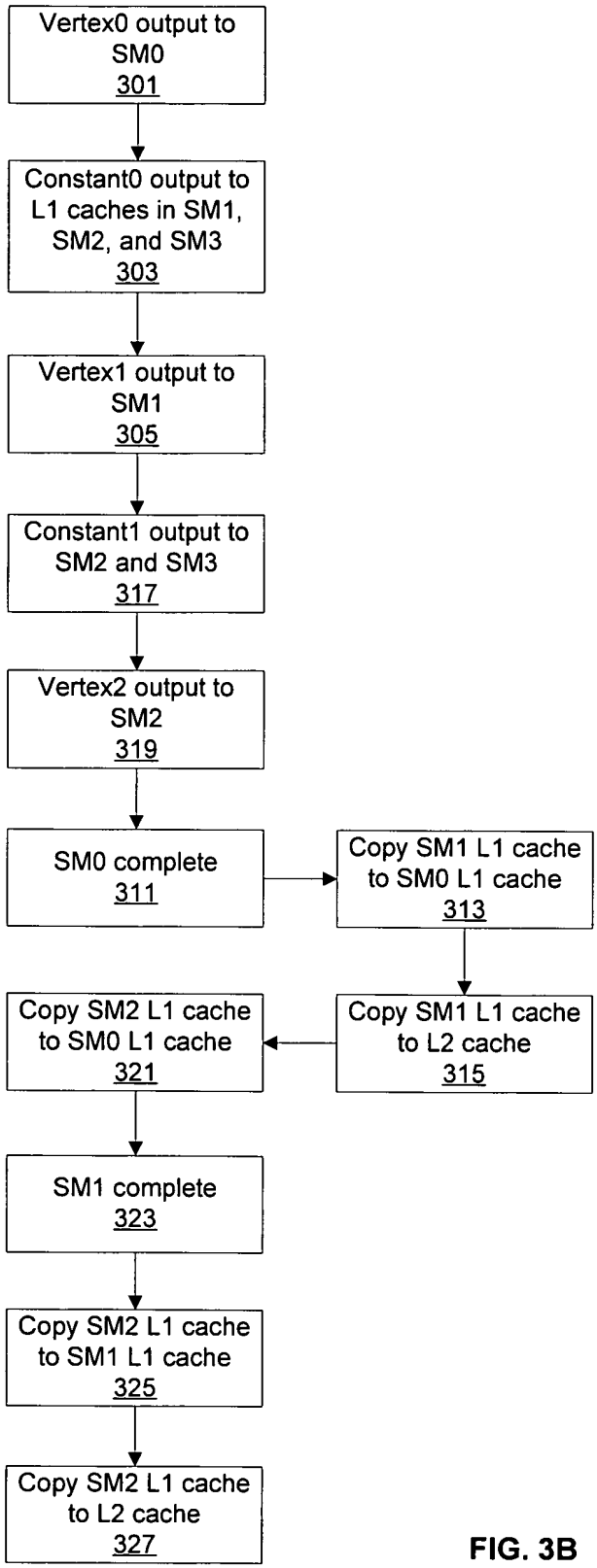
Vertex0 output to SM0
301
Constant0 output to L1 caches in SM1, SM2, and SM3
303
Vertex1 output to SM1
305
Constant1 output to SM2 and SM3
317
Vertex2 output to SM2
319
SM0 complete
311
Copy SM1 L1 cache to SM0 L1 cache
313
Copy SM1 L1 cache to L2 cache
315
Copy SM2 L1 cache to SM0 L1 cache
321
SM1 complete
323
Copy SM2 L1 cache to SM1 L1 cache
325
Copy SM2 L1 cache to L2 cache
327

FIG. 3B

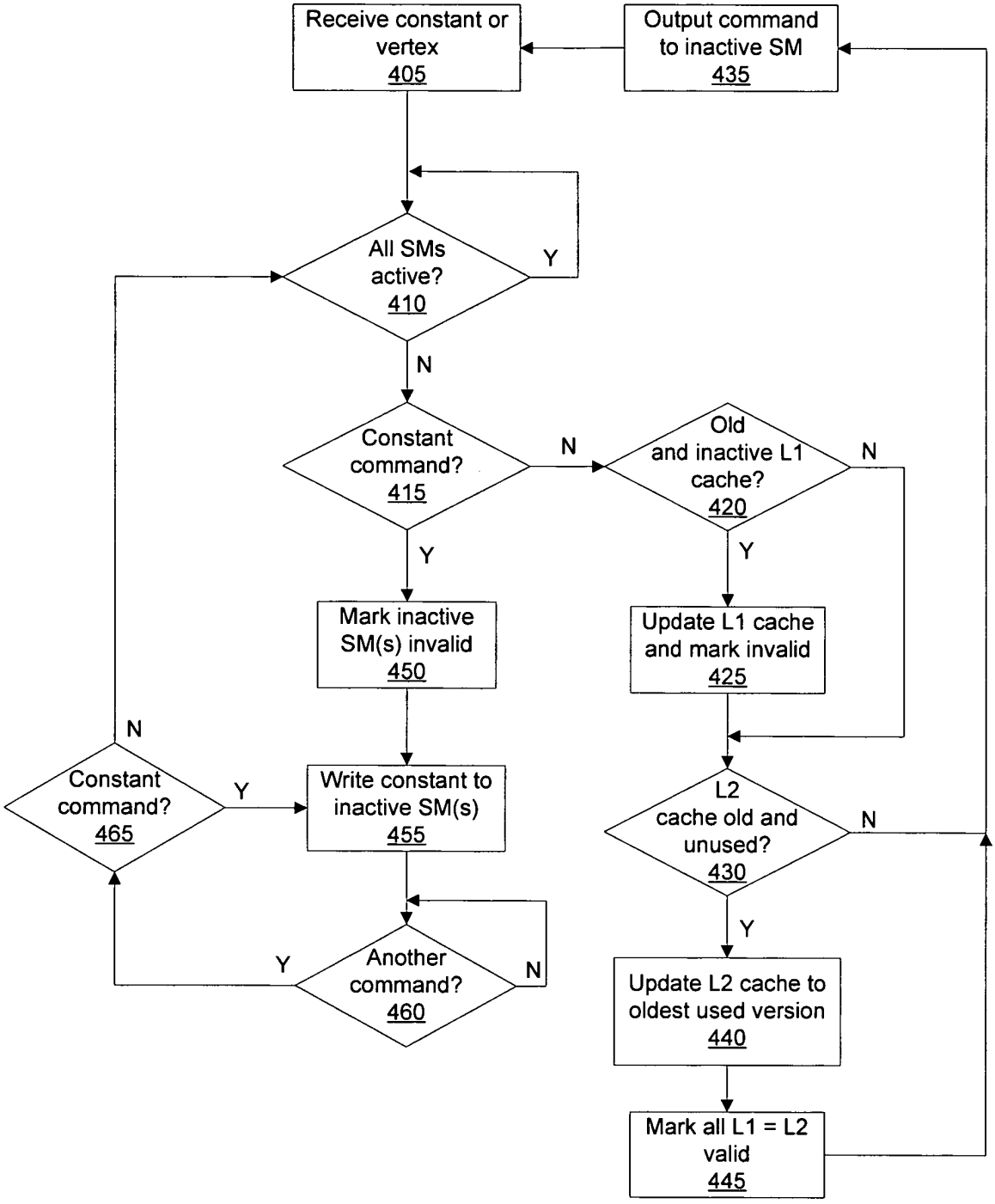
Receive constant or vertex 405
Output command to inactive SM 435
All SMs active? 410
Y
N
Constant command? 415
N
Old and inactive L1 cache? 420
N
Y
Y
Mark inactive SM(s) invalid 450
Update L1 cache and mark invalid 425
N
Constant command? 465
Y
Write constant to inactive SM(s) 455
L2 cache old and unused? 430
N
Y
Y
Another command? 460
N
Update L2 cache to oldest used version 440
Mark all L1 = L2 valid 445

FIG. 4

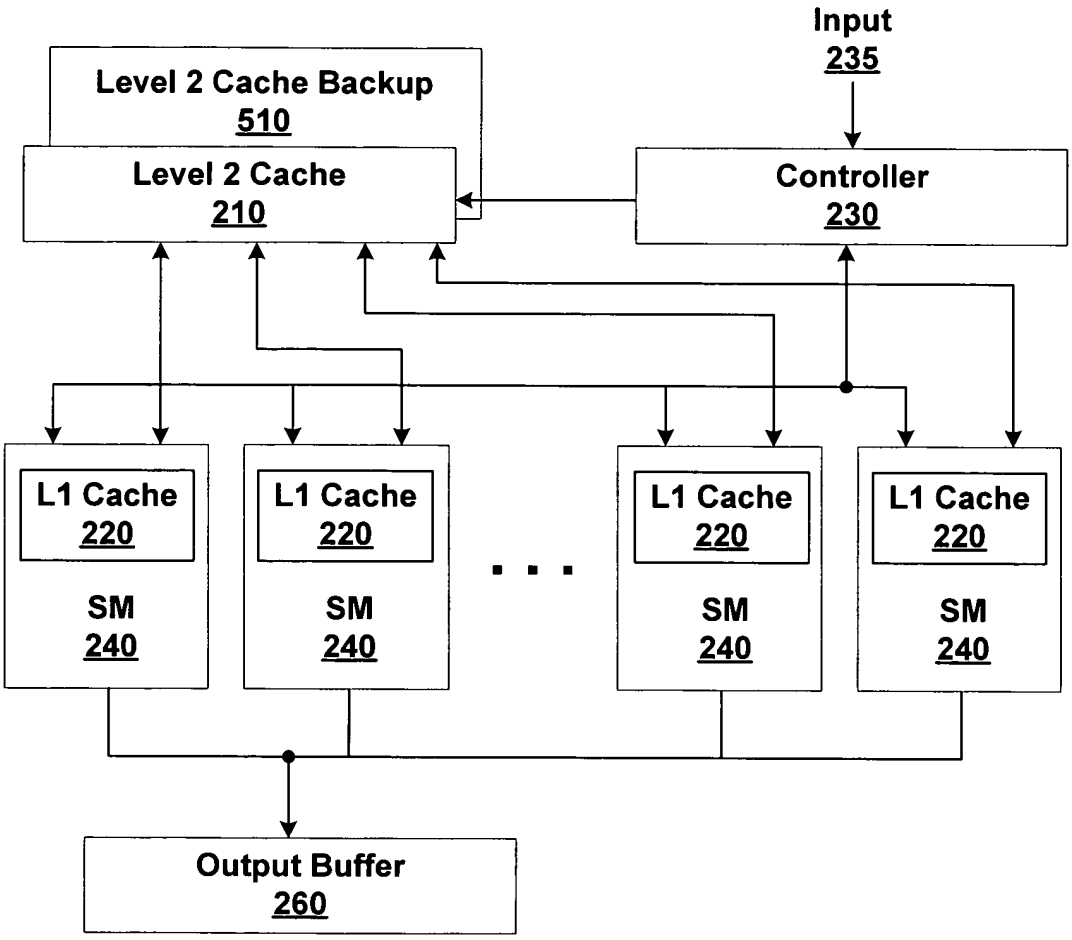
Input
235
Level 2 Cache Backup
510
Level 2 Cache
210
Controller
230
L1 Cache
220
SM
240
L1 Cache
220
SM
240
L1 Cache
220
SM
240
L1 Cache
220
SM
240
Output Buffer
260

FIG. 5

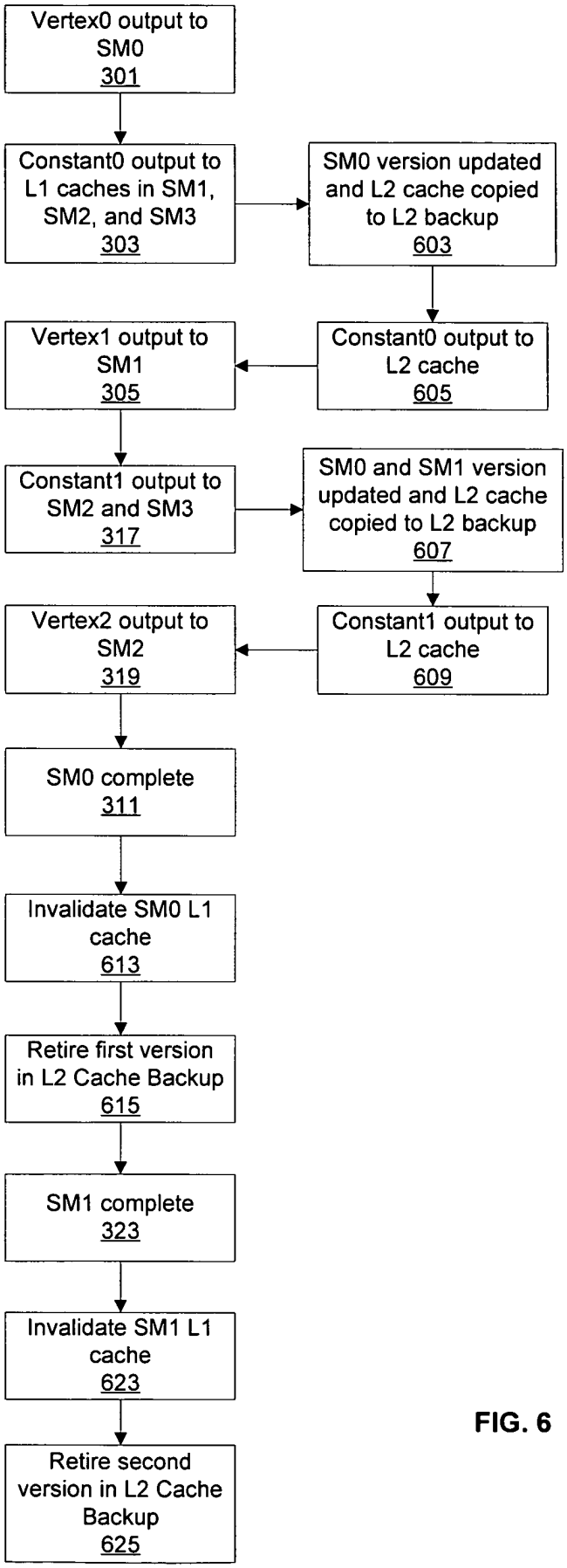
Vertex0 output to SM0
301
Constant0 output to L1 caches in SM1, SM2, and SM3
303
SM0 version updated and L2 cache copied to L2 backup
603
Constant0 output to L2 cache
605
Vertex1 output to SM1
305
Constant1 output to SM2 and SM3
317
SM0 and SM1 version updated and L2 cache copied to L2 backup
607
Constant1 output to L2 cache
609
Vertex2 output to SM2
319
SM0 complete
311
Invalidate SM0 L1 cache
613
Retire first version in L2 Cache Backup
615
SM1 complete
323
Invalidate SM1 L1 cache
623
Retire second version in L2 Cache Backup
625

FIG. 6

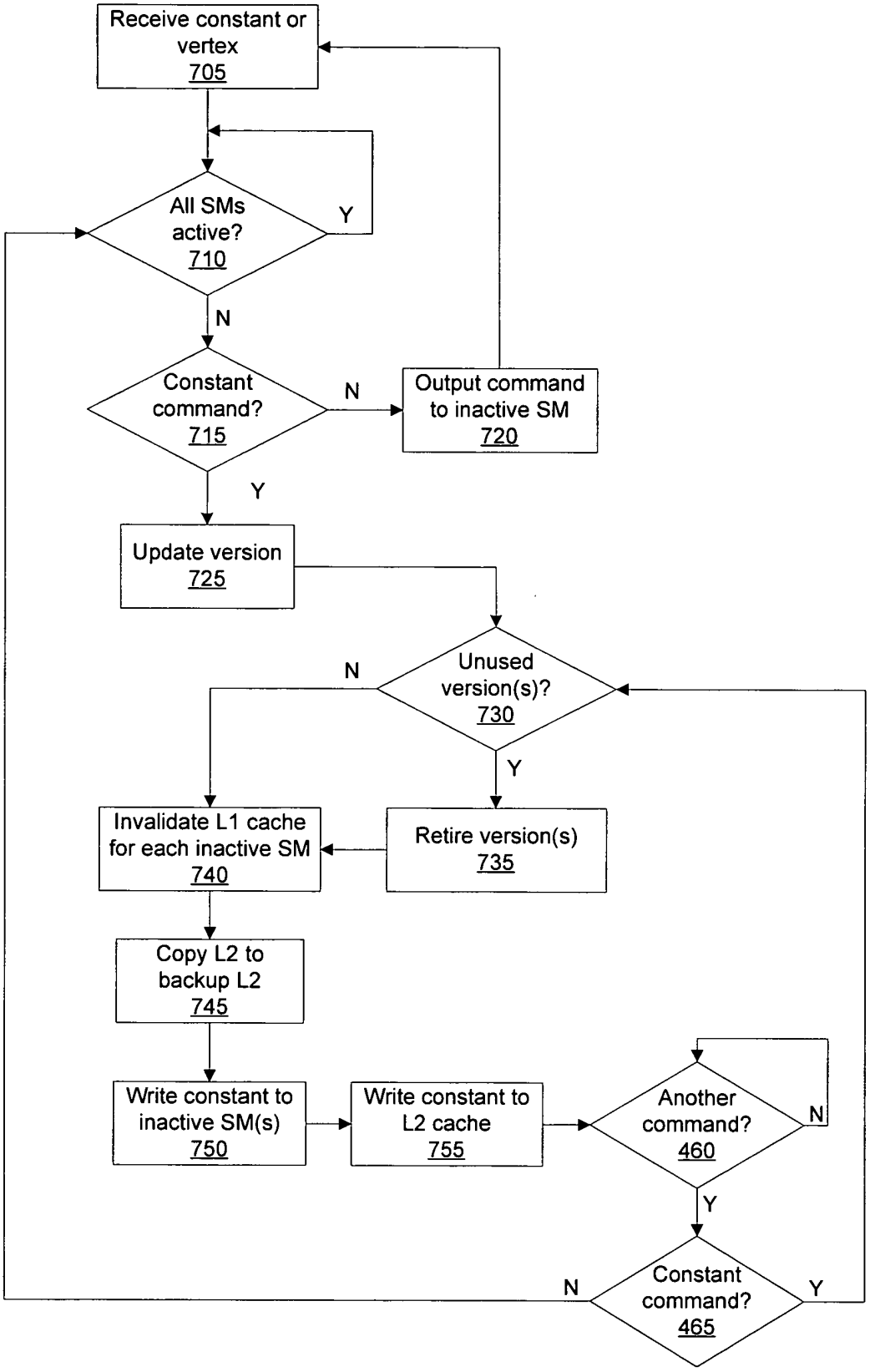
Receive constant or vertex 705
All SMs active? 710
Y
N
Constant command? 715
N
Output command to inactive SM 720
Y
Update version 725
N
Unused version(s)? 730
Y
Invalidate L1 cache for each inactive SM 740
Retire version(s) 735
Copy L2 to backup L2 745
Write constant to inactive SM(s) 750
Write constant to L2 cache 755
Another command? 460
N
Y
N
Constant command? 465
Y

FIG. 7

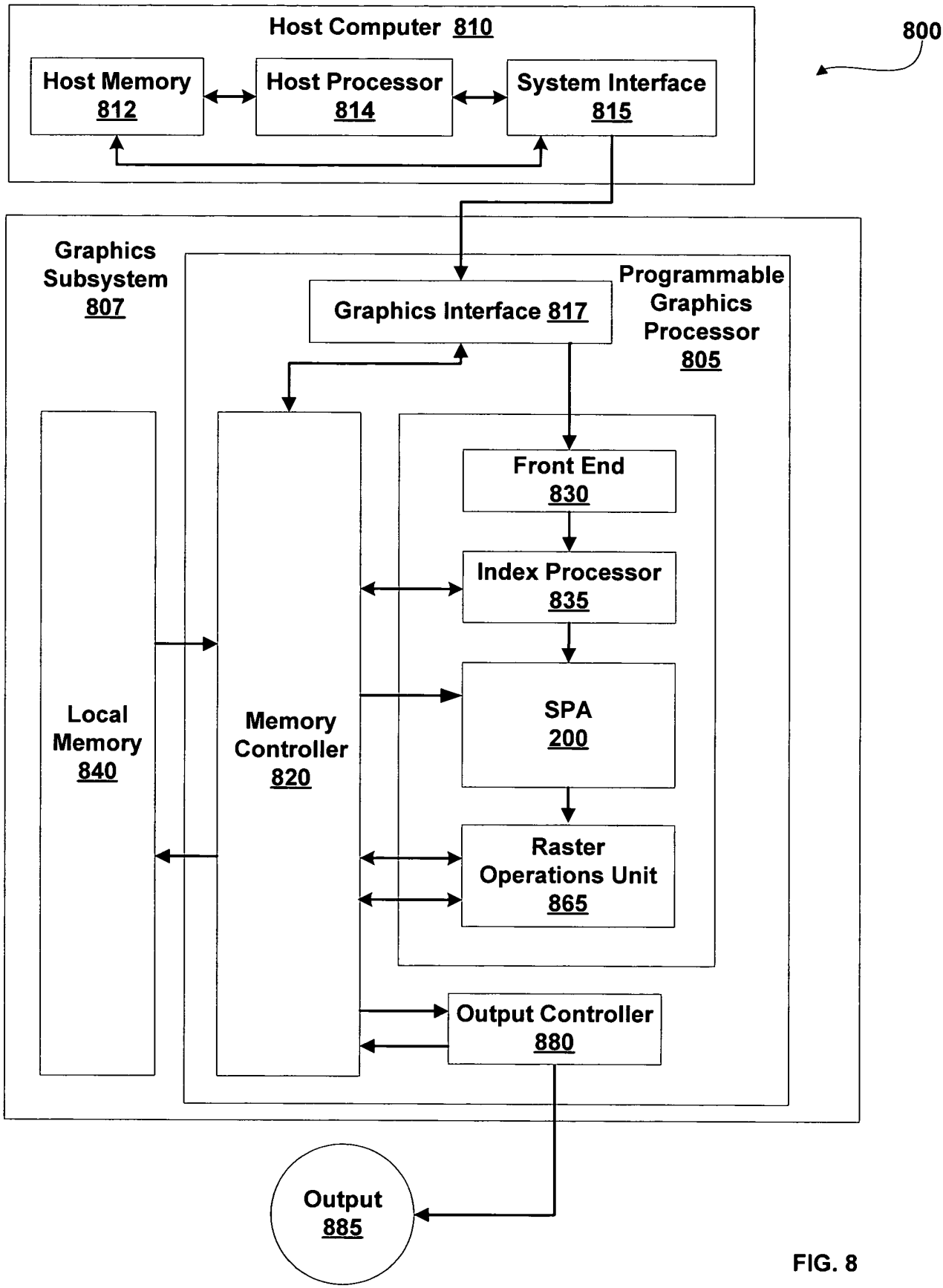
800
Host Computer 810
Host Memory 812
Host Processor 814
System Interface 815
Graphics Subsystem 807
Graphics Interface 817
Programmable Graphics Processor 805
Front End 830
Index Processor 835
SPA 200
Raster Operations Unit 865
Local Memory 840
Memory Controller 820
Output Controller 880
Output 885

FIG. 8